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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

MACKEY, TERRENCE M

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 02/05/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/938,644

Applicant(s)

RUEGER, NEAL

Examiner

Terrence Mackey

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1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-77 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 28-31, 39-66 is/are allowed.
- 6) ☒ Claim(s) 1-27, 32-38 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☒ Claim(s) 67-77 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C.

121:

- I. Claims 1 - 66, drawn to a method of forming a microstructure by micromachining, classified in class 438, subclass 710.
- II. Claims 67 - 77, drawn to an apparatus for plasma etching, classified in class 156, subclass 345.1.

The inventions are distinct from each other because:

Inventions claims 1 – 66 and claims 67 - 77 are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus can be used to deposit material onto a substrate.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

During a telephone conversation with Ryan Flax on January 15, 2003, a provisional election was made without traverse to prosecute the invention drawn to a process for plasma etching to form a microstructure, claims 1 - 65.

Affirmation of this election must be made by applicant in replying to this Office

action. Claims 67 – 77 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Oath/Declaration

The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because: It does not identify the citizenship of each inventor.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 8 recites the limitation "said biasing" in line 2. There is insufficient antecedent basis for this limitation in the claim. Line 3 of claim 8 also appears to be missing text following the word "and".

Claim 32 recites the limitation "the RF bias power" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim 33 recites the limitation "said magnetic field intensity" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

Claim 34 recites the limitation "said magnetic field intensity and said RF bias power" in lines 1-2. There is insufficient antecedent basis for these limitations in the claim.

Claim 35 recites the limitation "said RF bias power" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 36 recites the limitation "said magnetic field intensity" and "said RF bias power" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 37 recites the limitation "said magnetic field intensity and said RF bias power" in line 1-2. There is insufficient antecedent basis for this limitation in the claim.

Claim 38 recites the limitation "said RF bias power" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1 – 7, 9 – 11, and 24 - 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Johnson.

Johnson discloses the use of non-uniform magnetic field and/or non-uniform RF power to produce a gradient of plasma density that can be used to provide a gradient of low-energy ions and/or neutral particles for processing of substrates. Johnson discloses in column 10, lines 39- 48, that the magnetic field may be produced by permanent magnets as well as electromagnetic coils.

While the RF bias power and inductive power to be used in the process disclosed by Johnson are not given, it is seen as within the scope of one of ordinary skill in the art to use the power ranges claimed by applicant. Furthermore, it is also within the scope of one of ordinary skill in the art to control the characteristics of the processing plasma by simultaneously varying the magnetic field intensity, direction, and RF biasing power.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 12 – 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson.

Johnson's disclosed RF plasma etch process does not indicate the material to be etched nor that the etching is to be performed on a protruding or depressed region of the substrate. However it is seen as within the scope of one of ordinary skill in the art to perform Johnson's disclosed process on applicant's claimed substrate materials and configurations. Furthermore, while the etchant species to be used in the process disclosed by Johnson are not given, it is seen as within the scope of one of ordinary skill in the art to use the etchant gases claimed by applicant based upon the material to be etched.

Conclusion

Claims 28 – 31 and 39 – 52 include the limitation of forming a high negative charge density region on a contoured region of the workpiece by affecting the path of travel of free electrons with a magnetic field. Claims 53 – 65 include the limitation of varying the location of etching of a material layer by a plasma comprising free electrons and ions by varying the location of impingement by free electrons. Claim 66 includes the limitation of controlling a plasma etch process by varying the location of impingement by free electrons on a contoured surface of a workpiece and adjusting the RF bias power applied to the workpiece to change the intensity of etching. Watanabe et al discloses a microwave plasma processing method that varies the intensity of a magnetic field to change the

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distance between the surface of the workpiece and a flat resonance region of the plasma to control the processing characteristics. Kadomura discloses a plasma processing process wherein the ion/radical ratio and monoatomic/polyatomic radical ratio are controlled by varying the high frequency current and magnetic field generating current. Maydan et al discloses a plasma etching process wherein a variable magnetic field is used to vary etch characteristics such as etch rate, selectivity, and anisotropy. The prior art does not teach the use of magnetic fields in plasma etching processes to form such high negative charge density regions on a contoured region of the workpiece to thereby vary the etching characteristics on the contoured region nor does the prior art teach the impingement of free electrons to a workpiece during plasma etching to locally alter the location or intensity of the etching process.

Claims 28 – 31 and 39 – 66 are allowed.

Claims 1 – 27 and 32 – 38 are rejected.

Remaining references cited of interest show the state of the art.

Papers relating to this application may be submitted to Technology Sector 1700 by facsimile transmission. Papers should be faxed to Crystal Plaza 3, Art Unit 1765, using fax number (703) 305-6357. All Technology Section 1700 fax machines are available to receive transmissions 24 hrs/day, 7 days/wk. Please note that the faxing of such papers must conform to the Notice published in the Official Gazette, 1096 OG 30, (November 15, 1989).

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Terrence Mackey whose telephone number is

(703) 305-5504. The Examiner can normally be reached Monday - Friday from 7:00 AM – 4:30 PM.

If attempts to reach the Examiner by telephone are unsuccessful, the examiner's supervisor, Ben Uteck, can be reached at (703) 308-3836.

Any inquiry of a general nature or relating to the status of this application should be directed to the receptionist whose telephone number is (703) 308-0661.



ROBERT KUNEMUND
PRIMARY EXAMINER